GreenRoute

Candidates: 27, 47, 60, 9, 29, 61

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Introduction

The United Nations Sustainable Development Goal 13 calls for urgent action to combat climate change and its impacts by 2030 *(UNDP, Climate goals 2030)*. Climate change has become one of the most pressing challenges of our time. While it is often perceived as a distant issue that will mainly affect future generations, its consequences are already visible today. From slightly warmer winters to an increasing frequency of natural disasters, the effects are becoming more apparent each year. One of the main drivers of climate change is carbon emissions, with the transportation sector representing a significant share. Transport stands for 30% of the climate emissions in Norway *(Statistic Norway, 2019).* Everyday activities such as commuting to work, taking weekend trips, or travelling by plane contribute to these emissions.

To address the challenge of transport-related carbon emissions, we developed *GreenRoute*. This is an application designed to increase awareness of how everyday travel choices affect the environment. Many people are unaware of how much carbon different modes of transport produce, and this lack of information can make it difficult to make more sustainable decisions. *GreenRoute* aims to close this gap by providing users with clear and accessible information about the emissions associated with different travel options. By making this data visible and easy to interpret, the application helps users better understand the environmental consequences of their mobility choices.

The concept behind the name *GreenRoute* reflects the purpose of the application. We want to guide users toward more sustainable routes and transportation habits. Rather than only presenting raw data, the app focuses on communicating environmental impact in a simple and intuitive way so that users can easily compare alternatives and make informed decisions.

A key point of differentiation for GreenRoute is its use of behavioral design. By combining carbon calculations with personalized push notifications and clear visualizations, the app makes the environmental impact of transport decisions more visible, thereby encouraging more sustainable choices in everyday life. In this paper, we present the idea behind the application, explain how it is developed, and discuss how tools like *GreenRoute* can contribute to greater awareness of the climate impact of transportation.

Meet the team

The development of GreenRoute has been carried out by a team of six students from the Norwegian School of Economics. The group includes students from Norway, Switzerland, France, and Spain, bringing together perspectives shaped by different cultural backgrounds. This international composition has helped us approach the project with a broader understanding of the challenges related to sustainable mobility.

Collaboration within the team has been an important part of the project process. At an early stage, we identified our individual strengths and distributed the tasks accordingly. This helped structure the work and ensured that different parts of the project progressed efficiently. Through discussion and cooperation, we refined our ideas and shaped the concept behind *GreenRoute*. This exchange of perspectives strengthened the overall outcome of the project.

During the development of the project, the team also faced an unexpected challenge. At one point in the process, roughly one third of the original group decided to withdraw from the project. This required the remaining members to reorganize the structure of the work and redistribute responsibilities. Although this situation initially created some uncertainty, it eventually strengthened the collaboration within the team. With fewer members, we experienced a stronger sense of commitment and responsibility, as those who remained were motivated to contribute actively and take part in the learning process throughout the project.

Methodology for estimating transport carbon emissions

The methodology developed for GreenRoute is based on both scientific papers and official documents in order to provide a credible and transparent framework for estimating transport-related carbon emissions. According to the IPCC (2006), greenhouse gas emissions can be estimated by combining activity data with appropriate emission factors. In addition, according to the UK Department for Energy Security and Net Zero (DESNZ, 2025), standardized conversion factors can be used to calculate and compare emissions across transport categories in a consistent way. GreenRoute therefore relies on both academic literature and official reporting sources so that the app is grounded in recognized methods rather than arbitrary assumptions.

According to the IPCC, transport emissions are often assessed through distance-based indicators, which makes travel distance a relevant starting point for a simplified emissions model. For this reason, GreenRoute estimates emissions by combining the distance travelled with an emission factor corresponding to the selected transport mode. The main variables used in the app are therefore the trip distance, the transport mode, and, where relevant, the vehicle type and the number of passengers. This approach makes the methodology both practical for app users and consistent with recognized emission and accounting methods.

For private vehicles, GreenRoute estimates total trip emissions by multiplying distance by the relevant emission factor. The application can then divide this result by the number of passengers in order to estimate emissions per traveler. The formula used in the app is therefore the following:

$$\boldsymbol{CO_2e\ per\ passenger = d * \frac{ef}{p}}$$

where **d** represents distance, **ef** the emission factor, and **p** the number of passengers. This formulation is adapted from standard activity-data and emission-factor approaches described by the IPCC and operationalized in official reporting methodologies such as the DESNZ conversion factors.

For collective transport modes such as buses, trains, ferries, and airplanes, GreenRoute uses average passenger-kilometer emission factors. According to the UK Department for Energy Security and Net Zero, official conversion-factor datasets provide standardized factors for passenger transport modes, which makes it possible to compare alternatives without requiring highly technical trip-level data from users. In these cases, the estimation formula becomes:

$$\boldsymbol{CO_2e = d * ef}$$

GreenRoute also distinguishes between transport modes and energy sources. For example, gasoline, diesel, hybrid, and electric vehicles should not be treated as equivalent because they do not have the same emissions profile. According to the DESNZ methodology paper, conversion factors differ across passenger vehicle categories and transport uses, which supports the need for a mode-specific framework in the app. This distinction is essential to ensure that comparisons between options such as solo car travel, shared car travel, and rail transport remain credible. To operationalize this comparison, GreenRoute can rely on indicative factors for common car categories, as shown below.

Gasoline car	Diesel car	Hybrid car	Electric car
0,171 kg CO_2e/km	0,171 kg CO_2e/km	0,110 kg CO_2e/km	0,050 kg CO_2e/km

The table below illustrates how greenhouse gas emissions vary substantially across transport modes. According to "Framtiden i våre hender" (2024), these differences highlight the value of giving users a clear comparison of their travel options. However, these values serve as an illustrative benchmark rather than the sole scientific basis of the methodology.

Transport mode	Category / variant	g CO_2e per passenger-km
Train	Nordic electricity	7
Bus	Diesel	30
Car	Medium-sized gasoline	66
Ferry	Passenger only	186
Flight	Scheduled, economy	127
Flight	Scheduled, business class	284

Overall, GreenRoute adopts a methodology that is transparent and academically grounded. By combining distance-based calculations with mode specific emission factors, the app provides users with robust comparative estimates designed to support more informed transport decisions.

Business model:

GreenRoute is based on a simple idea, *help users better understand the environmental impact of their travel choices.* The objective is to make carbon emissions easier to estimate, compare, and interpret in everyday mobility decisions.

The business model of GreenRoute relies on a dual B2C and B2B logic. On the one hand, the app targets individual users who want to calculate and better understand the carbon footprint

of different transport options. On the other hand, it can also target organizations that want to raise awareness of greener travel choices and better assess the impact of transport-related emissions.

On the B2C side, GreenRoute creates value by offering a tool that allows users to compare the emissions of different travel modes. The core functionality of the app is the calculator itself. Users can input travel-related information and obtain an estimate of carbon emissions depending on the selected mode of transport. In line with the similar platforms, GreenRoute focuses on three broad categories: private transport, public transport, and human-powered transport. This keeps the app realistic from a development perspective and ensures that the value proposition remains consistent with what can be built during the course.

Several user groups are relevant in this B2C segment. First, environmentally conscious users may use GreenRoute to better understand the emissions generated by their daily transport choices. Second, students and young adults are a relevant audience because they are digitally engaged and likely to be interested in a simple and educational sustainability tool. Third, frequent travelers may benefit from comparing transport options before making decisions. The key point is that GreenRoute is not positioned as a full transport-planning platform, but as an accessible carbon-awareness and comparison tool.

On the B2B side, GreenRoute can be positioned as a straightforward support tool for organizations that want to encourage greener transport choices among employees or members. Rather than promising complex dashboards or advanced corporate integrations, the most realistic business value at this stage is to provide a practical platform that helps organizations assess and communicate the environmental impact of transport options. This is especially relevant for schools, companies, or other institutions that want to raise awareness and support more sustainable mobility behavior.

What makes GreenRoute different is not a large number of features, but the way it presents information in a clear and useful way. Most basic carbon calculators provide only a result. GreenRoute aims to go one step further by helping users compare transport options and better understand what their choices mean. In that sense, the value of the app lies in its simplicity, clarity, and educational function.

This is also directly linked to customer relationship and value. For individual users, GreenRoute mainly relies on a self-service relationship. Users can register, log in, and use the app independently to calculate and compare emissions. This makes the service easy to use

and scalable. For organizations, the relationship would be more structured, but still based on the same core product, *a simple digital tool that supports awareness and more informed transport decisions.* The value comes from accessibility, transparency, and ease of interpretation rather than from highly advanced analytics.

In terms of revenue, the most realistic approach is to keep the model lean. For the B2C segment, GreenRoute could remain free or low-cost in order to maximize accessibility and usage. For the B2B segment, revenue could come from offering the app or its methodology as a support tool for organizations that want to use it in sustainability-related contexts. At this stage of development, the most important point is not to define an overly complex revenue architecture, but to show that the project can create value for both individual and institutional users.

Overall, the business model of GreenRoute is based on a clear and feasible concept to provide a user-friendly carbon calculator that helps users and organizations better understand the environmental impact of transport choices. By keeping the scope realistic and aligned with what can actually be developed, GreenRoute remains both a credible academic project and a potentially relevant entrepreneurial idea.

What differentiates GreenRoute?

While many carbon calculators exist, most of them stop at providing a numerical result. GreenRoute is designed to go further by integrating behavioral design principles into the core of the application. The key differentiator is not only what the app calculates, but how it communicates that information to the user, and when.

GreenRoute draws on nudge theory, originally developed by Richard Thaler and Cass Sunstein (2008). The theory argues that people can be guided toward better decisions through subtle cues, rather than rules or restrictions. Rather than telling users what to do, GreenRoute presents information in a way that makes the sustainable option feel like the natural choice. This is achieved through personalized push notifications. These notifications are triggered at the moment the user is about to log a trip, which is precisely when the influence is most effective.

The timing of these notifications is intentional. Research in behavioral economics suggests that interventions are most powerful when they occur at the moment of decision, rather than before or after (Thaler & Sunstein, 2008). By delivering environmental information exactly when a user is entering their travel data, GreenRoute ensures that the message is relevant and actionable.

Crucially, GreenRoute does not only present raw emission numbers. Instead, the app translates carbon data into comparisons that feel meaningful and relatable. Rather than informing a user that a car trip emits 12 kg of CO_2e, the notification might communicate that this choice contributes to melting several square meters of Arctic ice, or that it is equivalent to the carbon absorbed by a tree over several months. This approach is grounded in research showing that concrete, emotionally engaging framings are more effective at motivating behavior change than abstract statistics alone (Spence et al., 2012).

This combination of precise timing, emotional framing, and comparative information is what sets GreenRoute apart from standard carbon calculators. The goal is not to create guilt, but to make the environmental consequences of everyday transport decisions feel real, personal, and worth acting on. In this way, GreenRoute uses digital technology not just to inform, but to gently nudge users toward a greener everyday life.

Conclusion:

GreenRoute is a project that combines climate awareness, methodological transparency, and entrepreneurial ambition. By helping users estimate and compare the emissions associated with different transport options, the app addresses a concrete problem. Many people want to make more sustainable travel choices, but do not have access to information that is sufficiently clear, comparable, and actionable.

The methodology proposed in this paper shows that transport carbon emissions can be estimated in a way that is both simple and academically grounded. By relying on scientific papers and official documents, GreenRoute ensures that its calculations are based on recognized principles rather than arbitrary assumptions. At the same time, the app remains transparent about the fact that its results are comparative estimates and not exact measurements.

Beyond methodology, GreenRoute also has a clear business potential. Through its dual B2C and B2B model, the app can address both individual users and organizations seeking to improve the sustainability of their travel choices. Its ability to combine carbon estimation, behavioral guidance, and practical alternatives makes it more than a standard calculator.

In this sense, GreenRoute reflects the objective of the course by transforming a methodological approach to carbon emissions into a practical app with both environmental and business value. This makes GreenRoute a strong example of how digital innovation can support both climate awareness and entrepreneurial action.

References:

Department for Energy Security and Net Zero (DESNZ). (2025). Greenhouse gas reporting: conversion factors 2025. UK Government. https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2025

Framtiden i våre hender. (2024). Klimagassutslippet fra ulike reisemåter. https://www.framtiden.no/tips/klimagassutslippet-fra-ulike-reisemaater

IPCC. (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. https://www.ipcc-nggip.iges.or.jp/public/2006gl/

IPCC. (2014). Climate Change 2014: Mitigation of Climate Change. Cambridge University Press.

Spence, A., Poortinga, W., & Pidgeon, N. (2012). The Psychological Distance of Climate Change. Risk Analysis, 32(6), 957–972.

Statistics Norway (SSB). (2019). Emissions to air. https://www.ssb.no/en/natur-og-miljo/statistikker/klimagassn

Thaler, R. H., & Sunstein, C. R. (2008). Nudge: Improving Decisions About Health, Wealth, and Happiness. Yale University Press.

UNDP. (u.å.). Climate action – Goal 13. https://www.undp.org/sustainable-development-goals/climate-action